Forest Health Protection

Report 04-17 December 2004

A Summary of Verbenone Treatments on Lookout Pass Ski and Recreation Area, 2004

Carol Randall, Tom Eckberg, Gary Kempton, Doug Wulff, Lee Pederson of Forest Health Protection and John Wright, Coeur d'Alene River Ranger District

Executive Summary

The forests in and around Lookout Pass Ski and Recreation Area has a significant component of lodgepole pine susceptible to mountain pine beetle (MPB) (*Dendroctonus ponderosae*) attack. Aerial detection surveys (ADS) began to detect lodgepole pine mortality attributed to mountain pine beetle in the vicinity of the recreation area in the mid 1990's.

In 2003, to protect lodgepole pine in buffer strips between existing ski runs, the Idaho Panhandle National Forest's (IPNF) treated 40 acres of buffer strips containing large diameter lodgepole pine with verbenone, the anti-aggregant pheromone for the mountain pine beetle. In 2004, 100 acres were treated-on the whole-treated areas were protected. Some attacks were noted, particularly along the edges of treated and untreated polygons and in units treated for the first time in 2004, which had 2003 attacks.

Surveys conducted in the fall of 2004 in untreated areas show continued beetle activity in untreated polygons. In one untreated unit, the District is responding with a timber sale to remove currently infested and older dead trees. Prompt removal of currently infested trees should reduce beetle population pressure on adjacent units; however, will not eliminate the potential for additional mountain pine beetle attacks.

To prevent mountain pine beetle mortality, an application of verbenone in high priority buffer strips in 2005 is advisable. Currently infested trees should be harvested prior to beetle flight (July) in 2005. In addition, managers might want to consider individual high-value tree protection, by using insecticidal sprays or for all trees in important buffer strips to protect against MPB and pine engraver (*Ips* Species) (IPS) attack (verbenone is not effective against IPS). Long-term solutions to bark beetle threat on Lookout Pass Ski and Recreation area should include development of a comprehensive vegetation management plan.

Introduction

Lookout Pass Ski and Recreation Area operates under a Forest Service special-use permit. Located on the border of the Idaho Panhandle and Lolo National Forests (LNF) the recreation area has provided winter recreation opportunities for over 67 years. The forests in and around the recreation area have a significant component of lodgepole pine susceptible to mountain pine beetle (*Dendroctonus ponderosae*). If mountain pine

beetles were to infest the forests of the ski hill, many of the larger diameter lodgepole pine trees in existing buffer strips between designated ski runs could be killed.

In 2003, in order to protect the lodgepole pine in buffer strips, the IPNFs, which administers the ski hill's special use permit, requested Forest Health Protection (FHP) funding to treat 40 acres of buffer strips having large-diameter lodgepole pine with Verbenone, which is the anti-aggregant pheromone for mountain pine beetle. The Forest also conducted an extensive survey of buffer strips on the existing ski hill, and on buffer strips between new runs that were being created in the summer of 2003. There were no new mountain pine beetle attacked trees in the 2003 verbenone-treated areas on the ski hills. A detailed summary of 2003 treatments and surveys on the ski hill can be found in, Randall, Carol. 2004. *An Evaluation of Bark Beetle Conditions and Treatments on Lookout Pass Ski and Recreation Area, 2003* (R1-FHP-TR-04-04).

This report summarizes information on the 2004 verbenone application, reapplication, and evaluation of treated and untreated units. It also discusses the 2005 FHP suppression request.

2004 Treatment

The Idaho Panhandle National Forests requested suppression funding to treat 100 acres in the Lookout Pass Ski and Recreation Area with verbenone in 2004. Polygons were prioritized for treatment using the following criteria: percent BA lodgepole pine, location of the polygon on the ski hill, mountain pine beetle hazard rating, and average diameter of the lodgepole pine component. A map of the buffer strip polygons is in figure 1 and their priority for treatment is summarized in table 1.

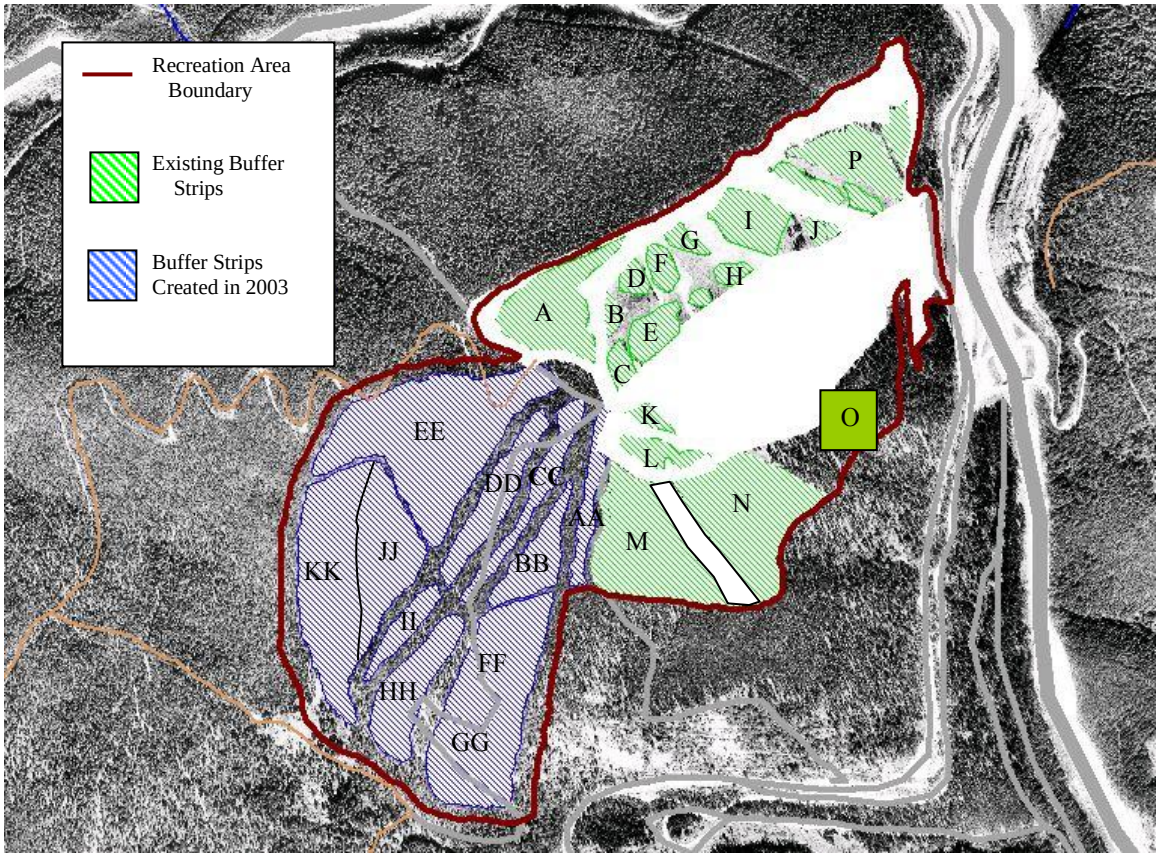
Based on the experience of other Forest Health Protection Specialists in Regions 1 and 4 (Gibson, Munson, and Progar, Personal Communication, 2003), we applied 20, 5-gram verbenone pouches per acre on a 15-meter grid (~45') to the treatment areas (polygons C, I&J, K, L, M, N, AA, BB, CC, DD, EE, FF, HH, & II) on May 2-3, 2004. We reapplied an additional 20, 5-gram verbenone pouches per acre to the treatment areas on July 13-14, 2004. Refer to Appendix A for lot numbers of the verbenone pouches applied to treatment polygons.

During the re-application process in July, crews looked for new mountain pine beetle attacks and found none.

Table 1: 2004 verbenone treatment priorities for buffer strip polygons between ski runs on Lookout Pass Ski and Recreation Area. (Refer to Figure 1 for polygon location).

Polygon	Acres	Priority	Polygon	Acres	Priority
A & B	10	Not treated	AA	3	1
C	1.2	12	BB	4.7	6
E	2.5	Not treated	CC	4.3	7
F	1.3	Not treated	DD	6	8
G	1	Not treated	EE	25	10
H	1	Not treated	FF	~11	11
I&J	5.5	13	GG	~9.5	Not treated
K	1.1	2	HH	7	9
L	2.5	3	II	2.5	14
M	12.1	5	JJ & KK	25.7	Not treated
N	14.1	4			
P	9.6	Not treated			

Figure 1: Lookout Pass Ski and Recreation Area Ski Hill Schematic Spring 2003. Green polygons (A-P) represent buffer strips between established runs in the spring of 2003. Blue polygons (AA-KK) represent buffer strips between runs created through harvest in the summer of 2003. O represents an area surveyed but not treated in 2004.



2004 Evaluation Methods

In September, Carol Randall, Tom Eckberg, Gary Kempton, Doug Wulff, and Lee Pederson of Forest Health Protection were joined by John Wright, Coeur d'Alene River Ranger District to evaluate the treatment at Lookout Pass. Treated and untreated units were surveyed to determine if beetle activity was present on the ski hill.

Surveys were conducted using defined Forest Insect and Disease Tally System (FINDITS) (Bentz 2000) methodologies. Based upon the size of the polygon, a number of basal area factor 20 variable radius plots were established a minimum of 130 meters apart and at least 60 meters from the edge of surveyed polygons. In each variable radius plot, the species and d.b.h. of "in" trees was noted as was a FINDITS damage code (0= healthy tree, 1= unknown mortality, 2= current year mountain pine beetle (MPB) attack, 3= last year MPB attack, 4= older MBP attack, 5= unsuccessful MPB attack, 6= current strip attack, and 7= older strip attack).

2004 Results and Discussion

The number of variable radius plots, trees surveyed, and insect activity noted is summarized by polygon in Table 2.

Table 2: Number of 20 basal area factor (BAF) variable radius plots, total number of trees sampled, and number of trees attacked in 2004, 2003, and earlier for polygons surveyed on Lookout Pass Ski and Recreation Area Fall, 2004.

POLYGON	# BAF 20 Plots	# Trees Sampled	# 2004 MPB Attacked Trees	# 2003 MPB Attacked Trees	# Older MPB Attacked Trees
A	7	75	0	0	0
D	2	19	0	0	0
E	2	19	0	1	1
F	2	24	0	0	1
H	2	21	0	0	0
I&J	6	64	3	0	0
K	2	32	0	0	0
L	3	52	1	0	0
M	10	166	0	0	0
N	10	97	4 (2 plots)	0	0
O	10	99	16 (4 plots)	14 (4 plots)	5 (3 plots)
P	7	43	11 (4 plots)	7 (2 plots)	0
AA	3	33	0	0	0
BB	4	51	0	0	0
CC	4	45	0	0	0
DD	5	66	0	0	0
EE	10	123	0	1	4(2 plots)
FF	5	56	1	5 (1 plot)	2 (2 plots)
HH	7	77	4	3 (2 plots)	1
II	2	21	0	0	0

Survey data was entered into Excel spreadsheets then run through the Forest Insect and Disease Tally System (FINDITS) program.

FINDITS survey results on 2004, 2003, and older mountain pine beetle attacks are summarized in Table 3.

Table 3: FINDITS survey results for treated and untreated polygons on Lookout Pass Ski and Recreation area, 2004. Grey-shaded rows represent polygons with 2004 MPB attacks.

Polygon	2004 Treatment	2003 Treatment	2004 MPB Attacks TPA	2003 MPB Attacks TPA	Older MPB Attacks TPA
A	No	Yes	0	0	11
D	No	Yes	0	0	0
E	No	Yes	0	7	18
F	No	Yes	0	19	25
H	No	Yes	0	0	0
I&J	Yes	Yes	11	0	0
K	Yes	Yes	0	0	0
L	Yes	Yes	6	0	0
M	Yes	Yes	0	0	0
N	Yes	No	6	0	0
O	No	No	29	43	21
P	No	No	27	31	3
AA	Yes	No	0	0	0
BB	Yes	No	0	0	0
CC	Yes	No	0	0	0
DD	Yes	No	0	0	0
EE	Yes	No	0	1	11
FF	Yes	No	19	22	30
HH	Yes	No	14	13	3
II	Yes	No	0	0	0

Survey results indicate that the majority of beetle activity is concentrated on the Montana portion of the ski hill. Polygons FF and HH were treated for the first time in 2004. Both of these polygons had mountain pine beetle activity in 2003 and earlier. Because there were beetles in these polygons at the time verbenone was applied in 2004, we surmise that beetle pressure within the unit was stronger than verbenone's ability to prevent attack.

Treatment polygon N experienced 2004 beetle attacks. The attacks in this unit were concentrated along the border of polygon N and polygon O, an untreated unit. Polygon O experienced significant beetle attacks in 2003 and 2004. It is likely that beetle pressure in polygon O was able to overpower the protection effect of verbenone along the treatment boundary.

During the survey, we found one current (2004) attack in polygon L.

The only other treated polygon to experience new 2004 mountain pine beetle attacks was Polygon I&J. Polygon I&J are adjacent to polygon P, which was not treated in 2003 or 2004. In 2003, polygon P averaged 31 attacked trees per acre and in 2004 polygon P averaged 27 attacked trees per acre. This represents a significant source of beetle population and, as in polygons N and O, we suspect the proximity of such beetle pressure to treated polygon I&J resulted in beetles overwhelming the treatment effect to a limited degree.

An interesting finding is the lack of current beetle activity in polygons E and F. According to the 2004 survey, both of these polygons had 2003 mountain pine beetle attacked trees present within their boundaries. Survey efforts in 2003 did not uncover this beetle activity. Neither unit was treated in 2004, however no new mountain pine beetle attacks were found.

Rate of Loss Predictions

A 10-year rate of loss prediction model developed by Cole and McGregor (1983) was run on survey information collected in the fall of 2004 from the buffer strip polygons. These results are summarized in Table 4. Cameron et al. (1990) found that in areas where mountain pine beetle populations became established, predictions of mortality using the Cole McGregor model were within 25% of the actual mortality observed.

Table 4: Cole-McGregor (1983) mountain pine beetle in lodgepole pine 10-year rate of loss prediction model (if beetle populations become prevalent in a stand) results for leave strip polygons surveyed in 2003 on the Lookout Pass Ski and Recreation Area.

Polygon:	Acres:	Stand Hazard:	Pre-Outbreak LP Pine TA	Estimated 10-Yr Post Outbreak LP Pine TA	Estimated % LP Pine TA Lost
A	10.0	HIGH	267	98	63%
D	1	HIGH	97	<1	99%
E	2.5	MOD	233	45	81%
F	1.3	MOD	206	31	85%
H	0.8	MOD	115	32	73%
I&J	5.5	MOD	186	26	86%
K	1.1	LOW	478	24	95%
L	2.5	LOW	712	129	81%
M	12.1	HIGH	867	147	83%
N	14.4	LOW	261	57	78%
O	12	HIGH	172	96	44%
P	9.6	MOD	82	59	28%
AA	2.96	MOD	643	84	87%
BB	4.69	HIGH	608	173	28%
CC	4.25	HIGH	526	149	72%
DD	5.96	HIGH	583	126	78%
EE	25.03	HIGH	672	70	90%
FF	&GG20.48	HIGH	439	100	77%
HH	6.94	MOD	281	67	76%
II	2.52	HIGH	267	128	52%

Highlighted rows represent polygons with current (2004) beetle activity. In most of the polygons on the ski hill, continued mountain pine beetle activity may result in significant losses to the lodgepole pine component.

Additional Suppression Efforts

FINDITS survey results for polygon O showed unacceptably high mountain pine beetle mortality. Lookout Pass Ski and Recreation Area is in the process of a continued expansion and a timber sale to clear additional runs on the Idaho side of the mountain are planned for the summer of 2005. The District was able to incorporate salvage harvesting polygon O into the planned expansion. It is expected an estimated 50,000 board feet of beetle-killed lodgepole will be removed from polygon O prior to beetle flight in 2005. Similar efforts may be considered for polygons P, FF, and HH.

Summary of Beetle Related Findings

The lodgepole pine trees and forests in and around Lookout Pass Ski and Recreation Area are susceptible to bark beetle attack. Many of the buffer strips between ski runs on Lookout

Pass are comprised primarily or exclusively of lodgepole pine and would be substantially altered if beetle populations became established and lived up to their potential for tree killing (Table 3). Suppression efforts, including harvesting currently infested trees and area treatments with the anti-aggregation pheromone verbenone in 2004/2005, may prevent some MPB-caused lodgepole pine mortality in 2006.

Surveys in untreated areas show that mountain pine beetle continues to kill trees in and around the ski hill.

While the use of verbenone may have reduced MPB-caused mortality, it is not effective in preventing attacks by other bark beetles such as IPS. IPS, often associated with logging activity, was present and active on the ski hill prior to expansion related logging activities. Periodic inspections of slash piles created during logging activity during the summer of 2003 uncovered no large populations of IPS. Slash created during run-clearing operations was piled and burned in the fall of 2003, removing a potential source for IPS populations in 2004. Wind throw during the winter of 2003-2004 created a new potential food source for IPS beetles, but periodic surveys of this material conducted during 2004 verbenone application and post-treatment evaluation did not find evidence of increasing IPS populations. Planned harvests for additional ski runs in 2005 should be conducted in a way that will prevent IPS population build-ups. FHP will be happy to assist with these efforts.

With the continued MPB and IPS activity in the vicinity of the ski hill, it will be necessary to continue to protect valuable susceptible lodgepole pine trees and stands.

Recommendations

- Many factors point to a potentially substantial and short-term reduction in the lodgepole pine component of the ski hill. While direct suppression efforts may increase the longevity of lodgepole pine, it would be prudent to consider what options are available to compensate for ongoing losses of this species. An evaluation of current conditions and threats to the vegetative component of the Lookout Pass Ski and Recreation Area would assist managers as they plan the future of the ski hill.

- An application of verbenone in high priority buffer strips in 2005 is advisable. In addition, managers might want to consider individual tree protection using insecticidal sprays for certain high-value trees or for all trees in important buffer strips to protect against MPB and IPS attack (verbenone alone is not effective against IPS).

- If possible, removal of currently infested lodgepole pine trees in polygons I&J, L, N, P, FF and HH should be considered along with the planned harvest in polygon O.

- In the spring of 2005, green wind-thrown trees or slash should be removed from within and around the recreation area as soon as is practicable. If left on or near the ski hill, this material may act as a breeding ground for IPS beetles, resulting in additional losses of green trees or top kill.

FY 2005 Suppression Request

The Idaho Panhandle National Forests requested funding to treat 120 acres in the Lookout Pass Ski and Recreation Area with verbenone in 2005. Polygons were prioritized for treatment using the following criteria: percent BA lodgepole pine, location of the polygon on the ski hill, mountain pine beetle hazard rating, and average diameter of the lodgepole pine component. Treatment polygons and their priority are summarized in Table 4.

Table 4: 2005 verbenone treatment priorities for buffer strip polygons between ski runs on Lookout Pass Ski and Recreation Area. (Refer to Figure 5 for polygon location).

Polygon	Acres	Priority	Polygon	Acres	Priority
A & B	10	Not Treated	AA	3	1
C	1.2	12	BB	4.7	6
E	2.5	Not Treated	CC	4.3	7
F	1.3	Not Treated	DD	6	8
G	1	Not Treated	EE	25	10
H	1	Not Treated	FF	~11	11
I&J	5.5	13	GG	~9.5	Not Treated
K	1.1	2	HH	7	9
L	2.5	3	II	2.5	14
M	12.1	5	JJ & KK	25.7	Not Treated
N	14.1	4	O	12	13
P	9.6	Not Treated			

Literature Cited

Bentz, Barbara J. 2000. Forest Insect and Disease Tally System (FINDIT) User Manual. USDA Forest Service Rocky Mountain Research Station General Technical Report RMRS-GTR-49. April 2000. 12 p.

Cameron, D.E., A. R. Stage, N. L. Crookston. 1990. Performance of three mountain pine beetle damage models compared to actual outbreak histories. USDA Forest Service Intermountain Forest and Range Experiment Station Research Paper INT-435. 13 p.

Cole, W.E., M.D. McGregor. 1983. Estimating the rate and amount of tree loss from mountain pine beetle infestations. USDA Forest Service Intermountain Forest and Range Experiment Station Research Paper INT 318. 22 p.

Gibson, Ken. 2003. Personal Communication. USDA FS Region 1 Forest Health Protection Entomologist. Missoula, MT.

Munson, Steve. 2003. Personal Communication. USDA FS Region 4 Forest Health Protection Entomologist. Ogden, UT.

Progar, Robert. 2003. Personal Communication. USDA FS Region 4 Forest Health Protection Entomologist. Boise, ID.

Appendix A

Pherotech Inc. lot number of verbenone pouches used by treatment polygon and date applied.
Lookout Verbenone Treatment Information:

Block	Acres	Opt Dosage per application	5/2-3/04 Lots (#)*	7/13-14/04 Lots (#)*
A	9.3	186	None	None
B	0.7 (1)	20	None	None
C	1.2	24	VP040427(24)	VP040426(10) VP040427(14)
D	1.0	20	None	None
E	2.5	50	None	None
F	1.3	26	None	None
G	0.9 (1)	20	None	None
H	0.8 (1)	20	None	None
I	4.7	94	VP040427 (94)	VP0040427 (94)
J	0.8 (1)	20	VP040427 (20)	VP040427 (20)
K	1.1	22	VP040427 (22)	VP0040427(22)
L	2.5	50	VP040427 (50)	VP0040427 (50)
M	12.1	242	VP040427 (242)	VP040427 (5) VP040426 (194) VP040422 (43)
N	14.1	282	VP040427 (282)	VP040422 (48) VP040427 (234)
P	9.6	192	None	None
AA	3	60	VP040427 (60)	VP40427 (60)
BB	4.7	94	VP040427 (94)	VP040427 (94)
CC	4.3	86	VP040427 (86)	VP040427 (11) VP040428 (75)
DD	6	120	VP040427 (120)	VP040428 (120)
EE	25	500	VP040427 (500)	VP040427 (500)
FF	11	220	VP040427 (220)	VP040427 (220)
GG	9.5	189	None	None
HH	7	140	VP040427 (44) VP040422 (96)	VP040427 (140)
II	2.5	50	VP040422 (146)	VP 040427 (146)
JJ&KK	25.7	514	None	None

*All verbenone lots had an extension of L1-2012/000 (Regular)